

BREEDING FOR DIVERSITY!

by Ingrid Wood



© T. Stephanie Thompson

“The greater the variability of the genomes in a population, the greater the likelihood of survival of the species in changing and hostile environments.”

— Mahlon B. Hoagland, 1981

The reed-thin bodies belonging to members of the African Masai tribe allow them to perform at maximum efficiency in a hot climate. Manute Bol, a member of this tribe recruited by the National Basketball Association more for his awesome height than for dazzling basketball skills, presents us with a near-perfect prototype for humans who must endure relentless heat in an arid land and be on the lookout for predators menacing their cattle herds. His northern counterparts, dwelling in regions where temperatures routinely plummet to below zero degrees Celsius, are better served with comparatively chunky and squat-looking physiques. The species we call *Homo sapiens* enjoys much diversity. We can argue, of course, that heating and air conditioning systems have made the necessity for “efficient” human body types obsolete.

Let’s examine this issue as it pertains to animals in general and, specifically, to alpacas. I started my research reading the material offered by the Rare Breed Conservancy. What a revelation! Even though I had known that the concepts of “rare” or “extinct” do not exclusively extend to wild creatures, the delightful diversity of domestic livestock species as presented in *A Rare Breeds Album of American Livestock* amazed me. If you thought that a pig is a pig is a (pink) pig, then think again. How about the Gloucesterhire Old Spots or the Guinea Hog? I’d never heard of a Florida Cracker (not the cattle anyway), a Pineywoods Cow, or an Oberhasli goat!

Aside from the fact that many of these breeds deemed rare by Conservancy members have proven themselves eminently suitable for specific climates and other environmental conditions, what other benefits do we accrue from their support?

The Value of Diversity

Obviously, there is the aspect of novelty! While people in impoverished countries must keep livestock for reasons of survival, many North

American land owners can indulge their whims by breeding animals for strictly ornamental and entertainment purposes.

Therefore, is there a compelling practical reason to preserve diversity among a species or even a breed? Absolutely! Dairy cows offer an excellent example in support of that premise. Years ago, when dairy farmers started to confine their cows to barns, bedded them on comfortable “mattresses,” and measured out scientifically developed feed rations, the black and white Holstein quickly became the “queen” of the milking parlor. This breed, more than any other, did a great job of producing milk under the above-mentioned conditions. It still does, but the pendulum of dairy cow husbandry is slowly swinging back the other way (as those of us who’ve “been around” know it always does). For example, publications such as *The Lancaster Farmer* now feature interviews with the proponents of rotational grazing on a regular basis. Dairy cows, once again, are led out to pasture to forage for their daily supply of grasses and legumes. Guess what? All of a sudden those breeds that have demonstrated superior ability to per-



form well under old-fashioned grazing conditions are making a comeback. The bottom line for many farmers is not how much milk a cow can produce, but the cost of production and the final profit margin. "What does all of this have to do with alpacas?" you might very well ask.

Alpaca Gene Pools

As alpaca breeders, we enjoy the rare fortune of having three fairly distinct gene pools at our disposal. Chilean, Bolivian, and Peruvian breeders, living in virtual isolation from each other, all developed their own distinct "type" of alpaca. Sure, phenotype as well as genotype overlap to a certain extent, but often even novice observers can assign animals to one of the groups upon casual inspection. How lucky we are! As breeders, we can choose to concentrate our program on one type as well as look towards one of the other groups to improve where our own stock is found wanting. The promotion of one phenotype as the only "correct" one is a concept borrowed from the breed associations of other species. The show ring, while offering some positive aspects in the breeding of animals, unfortunately also promotes a uniform "cookie cutter" look and the overuse of a small number of studs.

As breeders, we welcome this trend at our peril. The alpaca industry is still in its infancy. We cannot presently predict which paths it will travel, and which traits will become especially important in coming years. Let's hope all current genetic material will be available to future breeders when they should need it. Conservation and

active promotion of a generous selection of many various phenotypes and genotypes will insure richness in the alpacas' genetic pantry.

There is nothing wrong with expressing personal preference for one type over the other. There is everything wrong, in my opinion, with holding healthy, functional alpacas up to ridicule because they do not conform to our own vision of an industry standard. Such single-minded shortsightedness can cause untold harm. Alpaca breeders have much to learn from the genetic fiascoes of other species.

For decades, breeders of show dogs who only gave lip service to the primary function for which their breed was "designed" looked disdainfully upon those of us who bred primarily to race, course, hunt, point, herd, and guard with our animals. The American Kennel Club is now heavily promoting performance events. In some breeds, people are experiencing difficulty regaining genetic material they callously discarded decades ago. Plainly put, if you want to retain diversity, you must continuously select for it. If you want to harvest sweet potatoes, you can't just keep seed stock for the Idaho variety in your root cellar.

Genetic Poverty

The cheetah serves as a prime example of genetic poverty. One of the fleetest and most efficient hunters in the animal kingdom, the species is genetically so fragile as to face extinction. Experiencing what geneticists refer to as a "bottleneck," this species is homozygous (homo = the same)

for virtually all traits, not a favorable condition to ensure survival.

"Not a good example!" you say. "The alpaca population from the South American herd I favor is quite large. I don't have to worry about a genetic bottleneck."

Please consider that the large size of a specific population does not necessarily equate with genetic diversity. The relatively large Amish population in Lancaster County can be traced back to roughly thirty people who immigrated to this country to escape religious persecution. The current membership, suffering from a higher than average percentage of genetic defects, has their young people transported by "English" drivers to Amish settlements in other states. Their mission is the search for genetically "different" spouses.

Another case in point is a defect afflicting Doberman Pinschers. The breed still enjoys popularity in this country, to the tune of roughly a thousand AKC registrations per month! In a species where top studs often produce hundreds of offspring, population size once again does not translate into a significant difference in gene frequency. An alarming 30% of all Dobermans suffer from von Willebrand's disease, while another shocking 50% are carriers. Food for thought for alpaca breeders! The key word here is gene frequency. The more homozygous a population becomes, the less opportunity a breeder has to counteract faults and defects.

Michele S. Byers, executive director of the New Jersey Conservation Found-

ation, recently quoted Worldwatch Institute: "Nature has no reset button." The alpaca's genome, like that of any other species, must be jealously guarded to prevent the irreversible disappearance of alleles possibly crucial to its future health. Breeders cannot mount a successful genetic treasure hunt for lost genes. While mutations occasionally give desirable genetic boosts to organisms, they do not occur as frequently as people think. When they do, the results

unfortunately are quite often a new genetic defect.

A general rule of thumb tells breeders that beneficial, genetic diversity in a population rises as the number of studs used increases... a simple concept to comprehend. In their rush to breed to a well-known and "winning" stud, this concept is often ignored or even belittled by breeders of many species. In its extreme form, narrow selection pressure manifests itself in the devastation of an entire gene pool

by a specific defect. Thoughtful, long-range breeding plans involve much more than contracting for that popular show winner. To ensure the genetic health of our beautiful alpacas, the use of studs from all countries of origin as well as the service of little-used studs standing at small farms should be encouraged!

Allow me to conclude with a quote from the authors of *A Conservation Breeding Handbook*. It was written with recognized rare breeds in mind, but applies to alpacas as well. "Individual breeders have always been stewards of genetic diversity, and the stewardship practiced by many individuals is the only way to protect the treasure for the future." The meaning is clear: the differences in opinions, tastes, and interpretations of correct type among breeders benefit a population. Individual tastes should not of course, extend to selection for non-functional traits. I can't think of a single species where breeders should not take this advice to heart.

References:

- Hoagland, Mahlon B., 1981: *Discovery, The Search for DNA's Secrets*, (Houghton Mifflin Company)
- Sponenberg, D. Phillip and Carolyn J. Christman, 1995: *A Conservation Breeding Handbook*, (American Livestock Breeds Conservancy)
- Postlethwait, John H. and Janet L. Hopson, 1989: *The Nature of Life*, (McGraw-Hill, Inc.)
- Brewer, M.D. George J., 1999: *Today's Breeder* (Ralston Purina Company)

Ingrid Wood lives with her husband, Dave, five whippets, and a small herd of huacaya alpacas on Stormwind Farm in Burlington County, New Jersey. Her hobbies include spinning, gardening, and racing and coursing her whippets, as well as working with the alpacas. Ingrid's articles have been published in the U.S.A., Germany, and Australia. She offers genetics workshops for camelid breeders at Stormwind Farm, and can be reached at alpacas@uscom.com or (609) 261-0696.